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of great advantage to the practical side of life. Our improved agricultural plants may serve as an illustration. According to Hays the produce of entire districts may be increased ten per cent. by the careful and repeated selection of seed. And these results were reached by the aid of old methods, applied during a few years only. How great is the promise of the new methods, with their larger prospects and greater chances.

Next to new races are new species. Let this be the motto of science and practice alike, for the welfare of agriculture as well as for the welfare of man.

HUGO DE VRIES.

UNIVERSITY OF AMSTERDAM.

SIXTH ANNUAL MEETING OF THE NEW
YORK STATE SCIENCE TEACHERS
ASSOCIATION.

THE meeting was held December 27 and 28 in the Medical College of Syracuse University. The greater part of two half days was given up to the section meetings which are reported at the end of this article. There were also four general meetings. Friday evening was devoted to a dinner and social reunion, an innovation appreciated by all.

The following papers were read and discussed in general sessions:

The Value of Research Work in Education:

Professor SAMUEL J. SAUNDERS, Hamilton College, Clinton.

All education which attains its highest ends is of the nature of original research. The power to apply the research method should be raised to as high efficiency as possible before we stand face to face with the problems of life; it should be cultivated during the whole school career. Much of our modern educational effort fails because the pupil does not test his knowledge continuously and learn 'to do by doing.' The research method in science

trains the observation, the imagination and the memory. It increases manual dexterity and skill. It forces the student to stand on his own merits and makes of him a vital factor in the promotion of civilization and national prosperity.

The Study of Types: Professor N. A. HARVEY, Chicago Normal School.

A full abstract of this paper is printed in *School Science*, beginning with February, 1902.

The Report of the Committee on 'A standard College Entrance in Botany,' appointed by the Society for Plant Morphology and Physiology. Presented by Professor FRANCIS E. LLOYD, Teachers College, Columbia University.

This report is discussed in a recent number of *SCIENCE* (page 409).

Symposium, *What ought the high school teacher in each science to know? What ought he to be able to do? What are his opportunities for self-improvement?* Brief speeches by several members and guests.

Report of Progress of the Committee on Stimulants and Narcotics: Presented by the Chairman, Professor IRVING P. BISHOP, Normal School, Buffalo.

The report comprises: I., A comparison of text-books used in medical colleges and in the public schools of the state; II., opinions of the committee regarding the effects of alcohol; III., opinions of educators regarding present methods of teaching physiology; IV., conclusions of the committee from the preceding investigation; V., recommendations of the committee. The report urges that the state law be modified so as to give more freedom to the writers of text-books and the teachers of physiology 'to decide as to the character and content of their teaching.' It urges that less time be spent in trying to teach the physiological

effects of alcohol and tobacco, and more time in a treatment of the question from the moral and economic standpoint. The report is signed by Professor Irving P. Bishop, Buffalo Normal School; Dr. Burt G. Wilder, Cornell University; Dr. Gaylord P. Clarke, Syracuse University; Dr. Eli H. Long, University of Buffalo; James E. Peabody, Peter Cooper High School, New York.

Alcohol Physiology in the Public School:

Professor W. O. ATWATER, Wesleyan University, Middletown, Connecticut.

Professor Atwater, after disclaiming any desire to have his own experiments or any set of experiments taught in the schools, when there is so much of great importance to teach in the way of conclusions, said:

The amount of teaching of temperance physiology and the space given to it should be much less than is required by the legislation of a considerable number of states, including your own. The kind of teaching should be that which agrees most closely with the attested principles of physiological science; that which is both scientifically and pedagogically most reasonable. This, in my judgment, means a material modification of the legislation in many states, and an equally important change in the character of a large amount of the text-book instruction. These changes I believe to be called for in the interests of sound science, sound pedagogy, sound morals and effective temperance reform.

He would have some of the time and space now devoted to alcohol physiology given to the subject of food and nutrition in general, since a large part of preventable disease is due to errors in diet.

Referring to the state laws again, he said: Thus it comes about that we have in the United States a great educational movement which is attempting to build moral reform upon a basis of scientific doctrine

which the best scientific authority disproves.

Perhaps the matter has not occurred to you in just this light before, but is not this a fair statement of the case?

A large and increasing number of men of science are coming to realize that scientific error has found its way into the curricula of the schools and are earnestly considering what shall be done to correct it. A large and increasing number of intelligent and conscientious teachers are coming to feel more and more deeply the harm which comes from what they consider to be false science and wrong pedagogical methods, and are earnestly considering how they may be freed from the responsibility of the teaching and the children in their care may be freed from the harm that it brings. Over and against this is a great body of people, profoundly interested in education and morals, tremendously earnest in their self-sacrificing efforts to promote temperance reform, convinced that the present teaching is called for and proper, and determined that it shall be enforced. There is a clash between physiologists and teachers on the one hand and moral reformers on the other. Both seek the same end. They differ as to method.

After discussing the literature of alcohol physiology, and his own experiments, he presented his conclusions, a few of which follow:

We should not teach that alcohol is a food in the sense in which that word is ordinarily used. We should not teach that it is a poison in the sense in which that word is ordinarily used. We may say, and with truth, that alcohol in large quantities is poisonous, that in large enough doses it is fatal, and that smaller quantities taken day after day will ruin body and mind. But it is wrong to teach our boys that alcohol in small quantities, or in dilute forms in which it occurs in such beverages

as wine and beer, is a poison in the ordinary sense of the word. In all that we say on this point we must bear in mind that the intelligent boy knows well, and as a man he will know better, that people have always been accustomed to moderate drinking, as it is commonly called, and yet live in excellent health to good old age. If we tell him that alcohol in small quantities is poisonous in the sense in which he understands the word, he will see that we are exaggerating, that we are teaching for effect, and he will instinctively rebel against the teaching. We may say, and say truthfully, that the moderate use of alcohol is fraught with danger. But the cases where the occasional glass leads to excess are the exceptions. If we present them to the thoughtful boy as the rule or the common result, he will detect the fallacy and distrust the whole doctrine. We may be right in saying that alcohol often does harm to health when people do not realize it, that it prepares the system for inroads of disease, that there is a graduation of injury from forms scarcely perceptible to the utter ruin of body and soul. But to present the 'horrible examples' as a common result of drinking is illogical in itself, contrary to right temperance doctrines, and hence injurious to the children we teach. For that matter I believe the picturing of the frightful results of vice to young and innocent children is more harmful than useful. We ought not to teach that alcohol in small quantities is harmful. Still more should we avoid saying that it is commonly beneficial. Some of us as individuals may believe that its use in small quantities is generally desirable, but there is nothing in either the facts of common experience or in the results of scientific inquiry to justify the inference as a general principle. It is under some circumstances a valuable nutriment in the sense that it can yield energy to the body, but not in the sense that

it can build tissue. It is under other circumstances a poison in the sense that it is injurious to health. When taken in large enough quantities and for long enough time it is destructive to life. It is sometimes very useful and sometimes very harmful, but the harm that comes from drinking, in many communities, vastly exceeds the good.

While we cannot deny to alcohol a nutritive value, that value is very limited. In yielding energy to the body, it resembles sugar, starch and fat, though just how and to what extent it resembles them experimental inquiry has not yet told us. It differs from them in that it does not require digestion and is hence believed to be more easily and readily available to the body. It is not stored in the body for future use like the nutrients of ordinary food materials. The quantity that may be advantageously used is small. If large amounts are taken, its influence upon the nerves and brain is such as to counteract its nutritive effect and it becomes injurious in various ways. And finally there are many people who begin by moderate use and are led to disastrous excess. Alcohol may be useful to one man and harmful to another. One may take a considerable amount without apparent harm while another may be injured by very little. One may use it habitually without injury, while another may not. In sickness it may be a priceless boon, but it may likewise be the cause of physical, mental and moral ruin. The boy or the man, as long as he is in good health and does not need alcohol or medicine, is in general better off without it.

In speaking of the Connecticut school physiology law, the speaker said, in substance:

The last Connecticut Legislature repealed the former law, which, though less objectionable than those of some other states, including New York, was felt by

nearly all the leading educators in Connecticut to be too stringent. It was replaced by one which requires temperance instruction in a smaller number of grades, none being called for in either the primary grades or the high school, and leaves the character of the text-book and the kind and amount of instruction wholly to the decision of the school authorities. This change was brought about by a fortunate cooperation of the teachers and temperance organizations of the state, including the state branch of the Woman's Christian Temperance Union; though it was vigorously opposed by Mrs. Hunt of the Department of Scientific Temperance Instruction of the National W. C. T. U. The speaker believed that the example of Connecticut might well be followed in New York and other states.

In conclusion, Professor Atwater said: We wish to help the drunkard to reform; but is it necessary to tell him that no man can touch alcohol without danger? To build up the public sentiment upon which the reform of the future must depend, we wish our children to understand about alcohol and its terrible effects; but when we teach them in the name of science shall we not teach them the simple facts which science attests, and which they can hereafter believe, rather than exaggerated theories, whose errors, when they learn them, will tend to undo the good we strive to do? In short, is not temperance advisable, even in the teaching of temperance doctrine?

In the great effort to make men better, there is one thing that we must always seek, one thing we need never fear—the truth.

After a long and animated discussion, in the course of which the statements of Dr. Atwater and the committee were challenged by Mrs. Mary Hunt, of the National W. C. T. U., and a number of her followers, the report of the committee was adopted and

the committee was requested to continue its work for another year.

The following are the officers for this year: President, Professor William Hallock, Columbia University; Vice-President, Professor Howard Lyon, Oneonta Normal School; Secretary-Treasurer, A. R. Warner, Auburn High School. Executive Council, Professor Edward S. Babcock, Alfred University; Professor H. J. Schmitz, Geneseo Normal School; William M. Bennett, Rochester High School; Professor James H. Stoller, Union University; Principal Thomas B. Lovell, High School, Niagara Falls; Professor W. C. Peekham, Adelphi College, Brooklyn; Professor A. D. Morrill, Hamilton College; Professor E. W. Wetmore, State Normal College, Albany, N. Y.; Professor H. R. Linville, Boys' High School, New York City; Mr. Charles N. Cobb, Regent's Office, Albany; Professor J. H. Comstock, Cornell University, Ithaca; Professor E. R. Whitney, Binghamton High School.

FRANKLIN W. BARROWS.

SECTION OF PHYSICS AND CHEMISTRY.

This Section was in charge of Professor J. M. Jameson, Pratt Institute, Brooklyn, N. Y. Two sessions were held and each was well attended. At the session on Friday afternoon, December 27, 1901, Professor Charles B. Thwing, Syracuse University, read a paper on 'The Preparation and Training of the Teacher of Physics,' and Dr. Lyman C. Newell, State Normal School, Lowell, Mass., read a paper on 'The Preparation and Training of the Teacher of Chemistry.' Professor Thwing emphasized the necessity of broad and accurate training in physics and a wide knowledge of the salient points of contact of the other sciences with physics. Dr. Newell dwelt upon the need of a better knowledge of the fundamental facts of

chemistry, the desirability of original work, and the necessity of more attention to the application of psychology to the laboratory work. At the session on Saturday morning, December 28, 1901, Mr. J. R. Kittredge, Union Classical School, Schenectady, N. Y., read a paper on 'The College Entrance Preparation of Students as Viewed from the Secondary Man's Standpoint.' Professor Charles M. Allen, Pratt Institute, Brooklyn, N. Y., discussed 'Chemical Laboratory Notes,' and Mr. F. M. Gilley, High School, Chelsea, Mass., read and illustrated a paper on 'How to Meet the Problem of Teaching Physics by the Laboratory Method in Secondary Schools.' Mr. Kittredge made a plea for a four years' course in science with physics as the basis, Professor Allen illustrated his plan of presenting experiments and recording notes by the 'loose-sheet method,' and Mr. Gilley by two experiments illustrated his method of teaching a large section as a whole. The papers were discussed by the members of the Section, and a healthy interest was shown in the one thought of the meetings, viz., how to secure better teaching.

Reported by

LYMAN C. NEWELL.

STATE NORMAL SCHOOL, LOWELL, MASS.

EARTH SCIENCE SECTION.

The Earth Science Section met on Friday afternoon, December 27, and on the morning of Saturday, December 28.

At the first session the subject for discussion was the question of 'Geography for Training Students in the Normal Schools.' Discussion was opened by four twenty-minute papers given by Professor A. W. Farnham, of the Oswego State Normal School; Professor C. Stuart Gager, of the New York Normal College, Albany; Principal C. T. McFarland, of the Brockport Normal School; and Professor W. S.

Monroe, of the State Normal School, Westfield, Mass. The first two speakers paid particular attention to the work in physical geography that should be presented to normal students who are intending to teach in the elementary schools; the last two speakers emphasized particularly the human side of the work as it should be presented, Professor Monroe outlining at some length what to his mind should be included in such a course in reference to the races of men and their conditions and characteristics as related to their environment. All speakers agreed on the necessity of more time for geography work in the normal schools of New York State, and particularly for better coordination of the work, so as to secure more efficient geographical training.

The second session was devoted to the discussion of the preliminary report presented by the Committee of Seven appointed in 1900 to outline a course in physical geography for the secondary schools of New York State. Mimeographed copies of the report of the committee and of the course suggested by the committee were in the hands of all who attended. After a brief presentation of the main points of view held by the committee the discussion was led by Head Inspector C. F. Wheelock, of the Regent's Office; Professor A. P. Brigham, of Colgate University; and Miss Elizabeth E. Meserve, of the Free Academy, Utica. Informal discussion under a five-minute rule followed, and was participated in by many of those present.

Both sessions were particularly helpful and suggestive, and great interest was shown in the problems presented for discussion. At the close of the meeting it was voted to ask the Association to continue the Committee of Seven for one year, with the expectation that it would, at the end of that time, present a series of laboratory exercises for Physical Geography in Sec-

ondary Schools, and a Course of Study for Elementary Schools.

RICHARD E. DODGE,
Chairman.

TEACHERS COLLEGE,
COLUMBIA UNIVERSITY.

NATURE STUDY SECTION.

The program for this section was designed to bring out the opinions of those present on the training that a teacher should have in order to teach nature study. The first session was devoted to papers and discussions on these matters, and the second session to the relating of personal experience by teachers actually engaged in carrying on nature study work successfully in their schools.

The speakers were all present and the discussions were taken up with much vigor and interest. We agreed that the basis for successfully teaching nature study lies in an interest in the subject, a belief in its educational value in the broadest sense, and in a certain amount of personal experience with nature itself. That more training is desirable, if added to the above essentials, was admitted by all.

Miss Hill, Miss Carss and Professor Bardwell showed how much could be done by trained nature students in the instructing of both children and teachers. But it was shown by Miss King, Miss Whittaker, Miss Mershon, Mr. Round and Mr. Drum that special science training is not absolutely necessary to carry out the spirit of true nature study.

Mr. Beach, in presenting his plan for teachers' classes made practical suggestions which recommended themselves to all. No doubt many such classes will be formed during the coming year in cities. Mention was made of the correspondence course for teachers, conducted by the Bureau of Nature Study at Cornell University. Teachers were urged to make use of every

available opportunity to increase their knowledge of subject matter, not in order that they may teach facts, but in order that they may teach their pupils how to learn from nature.

MARY ROGERS MILLER,
Chairman.

CORNELL UNIVERSITY.

SECTION OF BIOLOGY.

Four papers were read and discussed:

The Preparation of Secondary Teachers in Biology: Professor F. E. LLOYD, Teachers College, Columbia University.

The high school is the 'college of the people' in a wide sense and worthy of the best efforts of well-educated and trained teachers. Owing to the inadequate preparation of many teachers the present work in biology shows a lack of uniformity in ideals, unevenness in the quality of instruction, and a remarkably heterogeneous high school course, taking the country as a whole. Those preparing for the profession of secondary teaching in biology should hold the bachelor's degree, and should have studied physics and chemistry. In biology they should have earned at least nine points credit before graduation, one third of which should have been in botany or zoology. Following this course of study they should have a professional training, including psychology, history and principles of education, special study of the problems of the high school and a course in the theory and practice of teaching biology in secondary schools. This latter course embraces two parts: (a) Theory, consisting of lectures and reading on the history and aims of the teaching of biology, on courses of study, topics, etc.; (b) practice, consisting in observation of teaching, construction of a course of study and examination of available materials. This course culminates in a season of actual teaching under skilled criticism. During the course the

candidate should pursue advanced work in botany and zoology.

Such a course may well be made to lead up to the conferring of degrees coordinate with those of law and medical schools and equal to them in significance.

What the Teacher of Botany in Secondary Schools should be Prepared to do: Dr. A. J. GROUT, Boys' High School, Brooklyn.

Ideals in Teaching: Professor A. D. MORRILL, Hamilton College, Clinton, N. Y.

In the modern teaching of natural history one of the first ideals to hold sway was taxonomy, then, the study of types, and, later, the investigation of physiological processes. At present no single ideal is in vogue. Along with these more or less clearly conceived general ideals there have grown up minor ideals which often are of an extra-scientific nature. Trimming the principles of biology to meet the exigencies of a set examination is a spectacle often seen in our midst.

In elementary work the pupil is of much greater importance than the subject, but many teachers think more of the symmetrical presentation of their subject than of creating in the minds of their pupils a liking for science. A similar blindness to proper methods leads other teachers to dull all the interest of discovery by giving preliminary lectures and demonstrations which make the laboratory period one of uninteresting verification.

The ideal best calculated to help the young pupil to break away from the dominating authority of books is the one that leads him into the paths of nature so that he comes upon the truths himself.

Well-directed work in biology develops individuality and independence in judgment. The example of one earnest, interested and independent student in a class is not less successful than that of the in-

structor in bringing indifferent workers into line.

The Training of a Science Teacher for Secondary Schools: Professor N. A. HARVEY, Chicago Normal School.

A teacher of science in a high school ought to know: (1) His subject, (2) the psychological movements involved in learning the subject, (3) the principles and the art of teaching.

Without knowledge of the subject matter, as complete as possible, no substantial progress can be made. But the teacher must not pursue one line of research to such a degree as to become one-sided, lest he attempt to drill his pupils in the methods of the trained investigator.

If the teacher would avoid the use of men's methods in trying to develop children's minds he must have more than a theoretical knowledge of the general laws of mental action. He must bring the mind of the child into the presence of truth in such a way that its activity will be aroused and growth will result.

Under the prevailing limitations, the normal schools do not properly train teachers for the high schools. Neither do colleges and universities offer an ideal preparation for the science teacher. The latter are occupied too exclusively with the idea of storing up knowledge, with little or no consideration of the psychology of the process.

There are three alternatives for securing better trained teachers: (1) Normal schools may modify their courses to meet the demands for high school teachers; (2) universities may change courses in pedagogy by introducing practice in teaching; (3) the science teacher may get the knowledge of his specialty in the university and his pedagogical training in the normal school.

HENRY R. LINVILLE,
Chairman.

DEWITT CLINTON HIGH SCHOOL, NEW YORK.